Monterey Bay National Marine Sanctuary

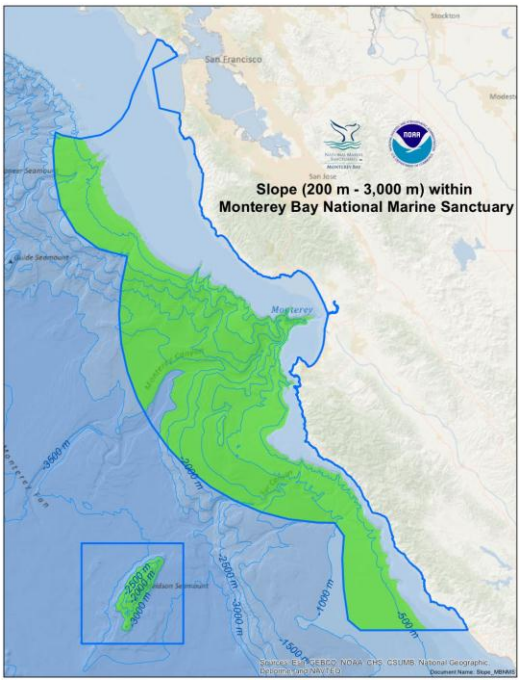
Habitat Characterization of the Continental Slope

Management Issue

Seafloor characterization of the continental slope (200 – 3000 m) is necessary to ground-truth habitat maps and inform management decisions at the Monterey Bay National Marine Sanctuary (MBNMS or Sanctuary).

Description

Seafloor habitats on the continental shelf, ranging from 200 – 3000 meter water depth, are found in 9,247 km^2 of the MBNMS and represent 58.6% of the total area of the Sanctuary. Yet they have only been minimally characterized and systematic monitoring has not occurred. Presently, there is a need to collect additional data on continental slope habitats and to synthesize existing data that has been collected by different institutions and research efforts. More complete data can be used to better understand species associations with particular types of habitat, as well as interactions between species and the vulnerability of particular species to human activities. Digital images and video captured using remotely operated vehicles (ROVs), autonomous underwater vehicles (AUVs), and towed camera sleds facilitate rapid, qualitative assessments of specific locations where human activities are planned or have occurred (e.g., laying cables, marine reserves). These images can also be used for more detailed quantitative assessments through time to monitor natural changes and recovery from human disturbances. Web-based GIS applications can provide easy access to geo-located images, facilitating the use of this information by educators and managers.



Continental slope habitat accounts for 58.6% of the total area of MBNMS. Map credit: Chad King/NOAA

Questions and Information Needs

1) What does the continental slope "look like" in specific locations?
2) What is the geology and substrate type at specific continental slope locations?
3) What are the distribution and abundance of organisms and habitats on the continental slope?
4) Where are areas of high species diversity associated with continental slope hard and soft bottom habitats?
5) How do corals and chemosynthetic communities on the continental slope provide biogenic habitat for other species?
6) How are benthic organisms changing through time in specific areas of interest (e.g., marine reserves)?
7) What is the vulnerability of different continental slope habitats and living marine resources, and are some continental slope habitats able to recover from disturbance at different rates than others?
8) What are the keystone and foundation species in continental slope habitats?
9) What species of particular management interest are located on the continental slope, and how are their populations changing?

Scientific Approach and Actions

- Groundtruth topographic and geologic habitat features on existing maps
- Scope areas for future comprehensive surveys using operationally expensive equipment (i.e., submersibles, ROVs, and AUVs)
- Complete rapid qualitative data collection with towed camera systems for areas of the MBNMS slope that are not characterized but might be accessible by this technique
- Synthesize existing continental slope data from MBARI, the IfAME/MBNMS partnership, and other research efforts
- Compile a library of still images and videos
- Develop methods to geographically display images over the Internet and educate the public about continental slope habitats and living marine resources

Key Partners and Information Sources

Monterey Bay Aquarium Research Institute, NOAA's National Marine Fisheries Service, Naval Postgraduate School, California State University Monterey Bay, U.S. Geological Survey

Management Support Products

- Higher resolution maps of continental slope geology and substrate type
- Integrated map of the distribution of fishes, invertebrates, and habitats of the continental slope seafloor
- Geo-located still and video imagery access system available on the Internet
- Identification of continental slope areas that are most vulnerable to human activities

Planned Use of Products and Actions

- Develop recommendations for marine protected areas management processes, and assess effectiveness of existing protections such as EFH areas
- Monitor areas of interest through time, including marine reserves and trawl recovery zones
- Create "fly-throughs" to share with public at Sanctuary visitor centers
- How do corals and chemosynthetic communities on the continental slope provide biogenic habitat for other species?

A brittle star that has climbed a sea pen waves its arms in Monterey Canyon at a depth of about 1,650 meters. Photo credit: © 2006 MBARI.

*A sea pig (*Scotoplanes globosa*) with juvenile crab (at right) and a pom-pom anemone (*Liponema brevicornis*; at left) inhabit the Monterey Bay continental slope at a depth of about 1,280 meters. Photo credit: MBARI/MBNMS.*

Program References

MBNMS Management Plan

- Sanctuary Integrated Monitoring Network (SIMoN) Action Plan, Strategy SI-1, SI-2, SI-3, SI-4
- Bottom Trawling Effects on Benthic Habitats Action Plan, Strategy BH-3, BH-5
- Marine Protected Areas Action Plan, Strategy MPA-2, MPA-9

MBNMS Condition Report

- What is the abundance and distribution of major habitat types and how is it changing? (Offshore Environment – Question 5)
- What is the condition of biologically-structured habitats and how is it changing? (Offshore Environment – Question 6)
- What is the status of biodiversity and how is it changing? (Offshore Environment – Question 9)
- What is the status of key species and how is it changing (Offshore Environment – Question 12)

ONMS Performance Measures

- By 2015, 100% of the sanctuary system has been adequately characterized
- Number of sites in which habitat, based on long-term monitoring data, is being maintained or improved
- Number of sites in which select living marine resources (LMRs), based on long-term monitoring data, are being maintained or improved